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AUTHOR Bridgeman, Dorothy J.; And Others
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ABSTRACT

This study examined the characteristics of family environment and its relationship to attitudes toward science. Data were collected from over 800 seventh-grade and over 1,400 tenth-grade students during a longitudinal, multi-dimensional study of the relationship between the variables of home, school, and self as related to attitudes toward and achievement in science. This population was examined by ability, grade, and time of school year. The two family-oriented subscales were targeted for examination as regressors to the dependent variable or attitude toward science. One of these, the family science subscale, included items to assess student perception of their family's science support. The other, called family general, consisted of items to assess student opinion of the quality of their family life. The regression model developed the probability level which indicated the relationship of the family science variable to science attitude was highly significant (0.001 level). This was true for ability-group tracks at each grade level and over time for each grade level. The family general variable was found to be an important predictor of attitude toward science for general ability groups for both grade levels and over time for the tenth-grade but not for the seventh-grade. Implications for improving student attitudes are noted. (Author/JN)

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RELATIONSHIPS OF ATTITUDE TOWARD SCIENCE AND FAMILY ENVIRONMENT

Dorothy J. Bridgeman
Department of Science Education
Steve Oliver
Office of Instruction Development
Dr. Ronald D. Simpson
Office of Instruction Development
University of Georgia
Athens, Georgia 30602

Presented at NARST
French Lick Springs Indiana
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Purpose of Study

The purpose of this investigation was to examine the characteristics of family environment and determine the nature of the contribution of family environment to attitude toward science. This investigation was made on data gathered as a part of a larger study[1] of attitude toward science. The larger study was a longitudinal, multi-dimensional study that had as its goals the examination of the relationships between variables of the home, school and self as they relate to attitude toward science. The data collection took place in a large school district of North Carolina during the 1980-81 school year.

Theoretical Basis for Study

Science as a subject in school has shown a closer link between attitude and achievement than any other school subject (Bloom, 1976). Several studies have shown close relationships between student's achievement and home environment. In a quantitative synthesis of studies of home environment and school learning Iverson and Walberg (1982) concluded that ability and achievement are more closely linked to the socio-psychological environment and intellectual stimulation in the home than they are to parental socio-economic status indicators such as occupation and amount of education.

[1]The study was supported by the National Science Foundation under grant No. SED7919784.

Studies of attitude and attitude change have traditionally been the interest of social psychologists. Some of the research indicates an attitude is more complex in both its development and expression than is generally understood. An attitude seems to develop out of interactions with a person's reference groups (peers, family, community) (Sherif, Sherif, & Nebergall 1965). As the child develops he learns his attitudes from these reference groups. The sociology of education is the study of the learning environment. This study is focused particularly on the family component of that learning environment. In understanding the student role in his learning environment it is important to remember that the child does not enter school untouched by the outside world . Each child brings his individual set of abilities, interests, values and attitudes with him and which should be expected to affect and influence his learning. Some of the difficulty associated with study of learning environment is that most of the social-psychological research on family socialization does not link the family and school system. (Boocock, 1980)

Sociological explanations of learning include causes that originate outside the school system (family background and society as a whole),or causes that originate inside the school (teacher behavior or teaching materials). The relationship between the family and school is a complex and sensitive one. Schooling demands the formation of social relationships more transient, more time-bounded than those characteristic of the family. Certain kinds of family environments, those that emphasize trust, freedom

of expression and shared power among parents and children encourage more positive self-reliance, and school coping skills.

With the change in family structure, studies of contemporary American families reveal that many are experiencing considerable stress in trying to coordinate their work and child-rearing responsibilities and are anxious about the job they are doing as parents. Parents are concerned with being better parents (Moore, Moon, and Moore 1975). Several studies revealed that when families were approached in a supportive way, they were receptive to cooperative efforts between school and home to improve, or expand the childs learning environment. Family status does not seem to be a factor in the desire to help one's children (Boocock, 1980).

It is generally recognized that family environment may be as important as family status and, moreover, that it is more susceptable to manipulation. Thus the last decade has seen a number of "homebound" or "home-intervention" programs to teach parenting skills and enhance family interaction (Boocock,1980). Several reports studying the headstart program pointed out that poverty is not a culture, that regardless of social position, parents can change specific aspects of their home environment (Hauser & Sewell 1976; Bereiter,1974)

There is evidence of a decline in interest in science among adolescent students in recent years (Hurd, 1983; National Commission on Excellence in Education, 1983). Science educators are searching for ways to attract the interest in science of more young people. There is a limit in most school districts to the amount of money that can or will be spent on the instructional

program. Perhaps a more economical and prudent place to look for means to improve attitudes towards science is in the family environment.

Procedures of Study

The population under study consisted of over 800 seventh grade students and over 1,400 tenth grade students. The students were from four randomly selected schools in the district and had been previously assigned to their ability group track (of which there are 3 levels) according to local school guidelines. The instruments were administered at the beginning, middle and end of the school year.

This investigation targeted the family oriented subscales as regressors to the dependent or responder variable of attitude towards science. Additional regressors included race, gender, father's job type, father's education, mother's job type, mother's education and family mobility. The items included in the "family science" subscale were to assess student perception of their family's science support. The "family general" subscale consisted of items used to assess student opinion of the quality of their family life.

The statistical design used in this investigation was multiple linear regression using the SAS procedure REG (SAS User's Guide, 1982). The population was examined by ability group track, by grade, and by time. Significance was established based on the T-value generated for the estimated regression coefficients, and a probability level of 0.05 were used to identify those coefficients

that were important predictors of the responder or dependent variable.

Family environment is defined as being the interactions which take place between family members. They are reflected in the members behaviors and attitudes in other places such as the school. The high degree of influence of the family on a student's schooling is generally established.

Results

In the regression model developed the probability level which indicated the relationship of the "family science" variable to science attitude was significant (0.0001 level). This was true for all ability-group tracks at each grade level and over time for each grade level. The "family general" variable was found to be an important predictor of attitude toward science for Track 2 (general) ability-groups at both grade levels and over time for the tenth grade but not over time for the seventh grade. The seventh grade Track 2 probability for the T-value is 0.0754 which is close to the established level of significance. The gender variable was a significant predictor in Track 3 of the tenth grade only, but this was over time. Gender is not a significant indicator variable in any other track. The mother's job variable is a significant indicator for Track 3 seventh grade and is at the 0.065 level for tenth grade Track 3, but not over time. See table 1 for a complete representation of these relationships and their importance.

Conclusions and Implications

When Iverson and Walberg (1982) refer to the socio-psychological environment of the home they refer to the measures of attitude, values, interest and encouragement which are a part of the family interactions. The interactions are also called the process-variables of the home-environment.

> The quantitative synthesis suggests that academic ability and achievement are more closely linked to the measures of the socio-psychological environment and intellectual stimulations in the home than they are to parent socio-economic status indicators suich as occupations and amounts of education (p. 150-151).

The findings of this investigation agree with the Iverson-Walberg synthesis concerning the effect of home environment. The implications are that the interactions between adolescent and family members, the influence of these process-variables, are more important in their effect on science learning than those of social and economic status.

It can be concluded there that there is a need for science education researchers to further examine the family environment variables, such as expressed in the "family science" subscale and "family general" subscales. The subscales provide a substantial list of alterable variables in a student's learning environment which can improve attitudes toward science among adolescent students. If adolescents are to receive the full value of a good education they must be receptive to science instruction. The family environment variables may well increase the receptivity required.

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Table 1

Relationships between Home Environment Variables and Attitude toward Science

Variable	Grade Seven		Grade Ten	
	T_1* p value	T_3* p value	T_1* p value	T_3* p value
Track One				
Sex	0.832	0.811	0.092	0.722
Race	0.216	0.165	0.251	0.068
Family General	0.802	0.750	0.814	0.656
Family Science	0.0001	0.0001	0.0001	0.0001
Fathers Work	0.238	0.735	0.614	0.678
Fathers Education	0.161	0.405	0.339	0.587
Mothers Work	0.961	0.975	0.738	0.788
Mothers Education	0.643	0.142	0.640	0.835
Lived in Community	0.913	0.462	0.406	0.868
Schools Attendance	0.774	0.809	0.507	0.619
Track Two				
Sex	0.963	0.390	0.864	0.341
Race	0.502	0.716	0.855	0.186
Family General	0.497	0.0754	0.009	0.021
Family Science	0.0001	0.0001	0.0001	0.0001
Fathers Work	0.781	0.183	0.798	0.323
Fathers Education	0.324	0.308	0.785	0.024
Mothers Work	0.895	0.107	0.335	0.246
Mothers Education	0.497	0.902	0.957	0.065
Lived in Community	0.391	0.537	0.780	0.440
Schools Attendance	0.468	0.484	0.375	0.122
Track Three				
Sex	0.717	0.907	0.013	0.020
Race	0.571	0.901	0.956	0.983
Family General	0.465	0.707	0.842	0.858
Family Science	0.0001	0.0001	0.0001	0.0001
Fathers Work	0.416	0.308	0.364	0.487
Fathers Education	0.877	0.707	0.549	0.382
Mothers Work	0.020	0.342	0.065	0.461
Mothers Education	0.287	0.430	0.521	0.887
Lived in Community	0.101	0.409	0.092	0.163
Schools Attendance	0.450	0.591	0.913	0.775

*T_1 was fall of the school year; T_3 was spring of the school year.

Table 2

Means for Total Seventh and
Tenth Grade Classes

Variable	Grade Seven			Grade Ten		
	N	Mean	SD	N	Mean	SD
Family General 1[a]	818	4.11	0.67	1423	4.04	0.66
Family General 3[a]	818	4.10	0.69	1423	3.97	0.65
Family Science 1[b]	818	2.99	0.73	1423	2.76	0.69
Family Science 3[b]	818	2.97	0.73	1423	2.81	0.67
AS 1[b]	818	3.57	0.83	1423	3.17	0.84
AS 3[b]	818	3.31	0.91	1423	3.09	0.81

[a]Family General 1 was given in fall of the school year
Family General 3 was given in spring of the school year

[b]Family Science 1 was given in fall of the school year
Family Science 3 was given in spring of the school year
AS 1, Attitude toward Science was given in fall of the school year
AS 3, Attitude toward Science was given in spring of the school year